HAIL DAMAGE IN WAUSHARA COUNTY - SYMPTOMS, SIGNS AND MANAGEMENT OPTIONS
Wisconsin DNR - Forest Health Protection, May, 2000

During May,2000, hail storms caused significant property and forest damage in central and northeastern Wisconsin. These storms, often accompanied by high winds, caused a variety of injuries to young and established trees and shrubs. This publication describes these damages and provides management options.

YOUNG (<15 YEARS OLD) RED AND WHITE PINE

These trees suffered two types of damages:

1) multiple wounds on the main stem and branches (Figures 1, 2, 3) and
2) damage or sheering of current year's buds (Figure 4).

Figure 1. Red pine

Figure 2. White pine

MULTIPLE WOUNDS

Even though trees have a natural defense mechanism that assists in closing wounds and limiting decay, the large number of these wounds will cause some branch and top mortality. One month after the storm, severely affected red and white pine are beginning to show branch mortality (Figure 3). Another complicating factor involves a fungus named *Sphaeropsis* that invades wounds on conifers and has the potential to cause further branch and top mortality. Moisture stress from drought will exacerbate this already stressful situation; adequate rainfall during the growing season will be critical for survival of these trees.

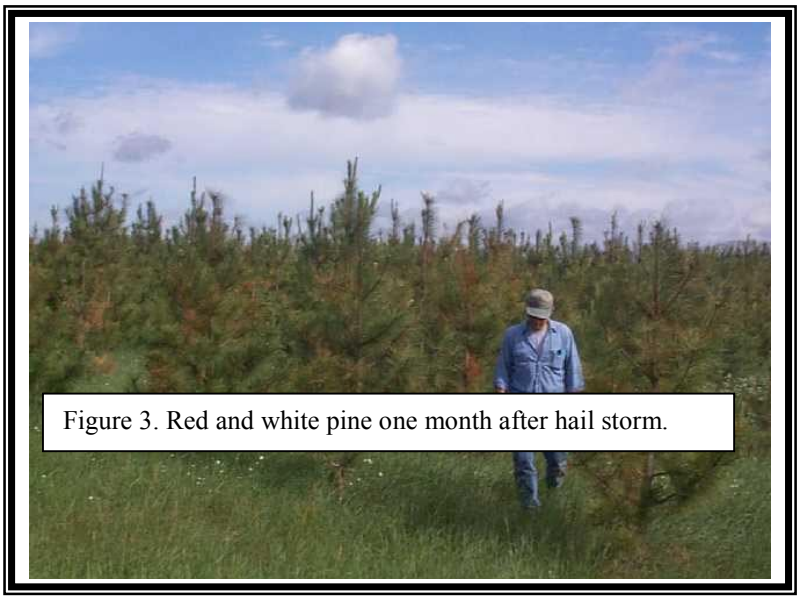

Figure 3. Red and white pine one month after hail storm.

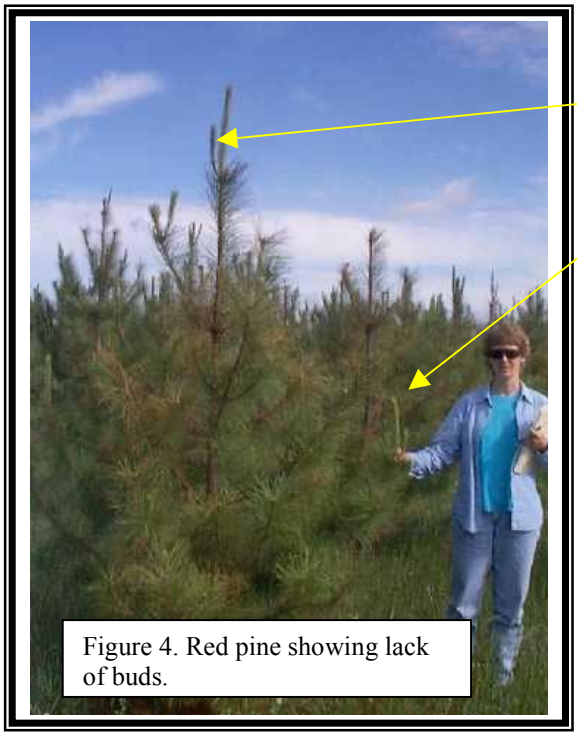

Figure 4. Red pine showing lack of buds.

DAMAGE AND DESTRUCTION OF BUDS

Figure 4 illustrates a red pine with only its terminal leader and a lateral bud developing. Most all of the other buds on the tree were destroyed. This will reduce the amount of new growth on the tree significantly which will reduce the "energy" the tree needs to put on height and diameter growth and to produce new buds for next year.

PROGNOSIS FOR YOUNG CONIFERS

By fall, severely affected branches will be dead and an assessment can be made of the health status of damaged trees. Trees that lose > 1/2 - 3/4 of their branches will be highly stressed and most likely to die if any other stresses occur. Trees that lose <1/2 of their branches will be more likely to survive but will still be susceptible to infection by the fungus *Sphaeropsis*. If infection by *Sphaeropsis* occurs, additional branch mortality will occur and some trees' tops may die. If you are debating whether or not to cut all trees down and start over, consider waiting and making an assessment in the fall of 2000 and again in 2001. The survival of these trees depends on the level of damage, their vigor (crown mass and root mass), weather and the pressure from insects and diseases. A clearer picture will present itself in about a year.

OLDER CONIFERS - MULTIPLE WOUNDS AND BUD LOSS

Older conifers also received multiple wounds (Figures 5, 6) and suffered a significant loss or damage to current year's buds. Affected trees will have reduced height and diameter growth for at least one year. Observe your trees at least once a month. If you notice a significant amount of foliage turning brown, two things could be happening. 1) Multiple wounds could be causing branch mortality or 2) Pine bark beetles could be infesting wounded trees. If bark beetles are involved, prompt salvage or removal of infested trees will help minimize the impact of an infestation.

Figure 5. Red pine with wound.

Figure 6. White pine with the bark striped off to reveal multiple wounds.

OAK - STEM WOUNDS

Figure 7 illustrates hail wounds on a sapling oak. If the bark of oak has developed into the corky stage, little damage from hail is expected. If the bark is very thin (very young oaks), branch mortality and whole tree mortality is expected.

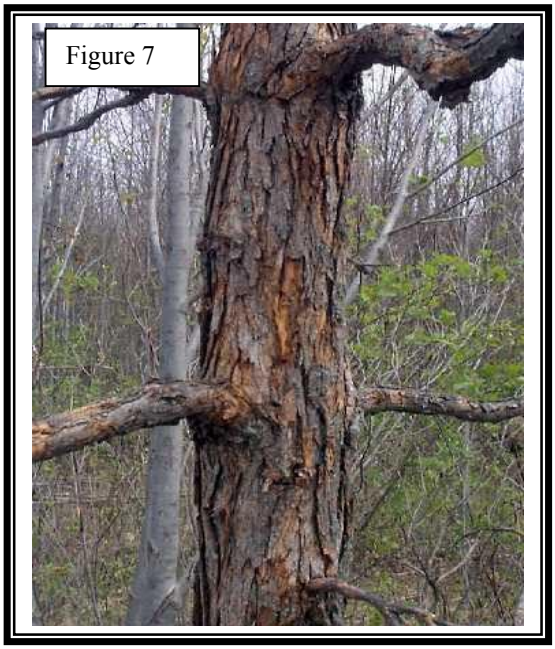
Figure 7

OAK WILT

These wounds occurred at a very bad time for oak. Oaks are highly susceptible to infection by the fungus causing oak wilt (*Ceratocystis fagacearum)* during spring and early summer. Infection occurs when an oak is wounded and a sap-feeding beetle, carrying the fungus visits the wound. If your oak was infected during this storm, you will observe discoloration, wilting and defoliation of leaves by late July. These symptoms will occur on infected red, black and northern pin oak. Infected white and bur oaks will show only one to a few branches with discolored and wilting leaves. If you do not observe wilting by late July, your tree was not infected as a result of this storm. You may be tempted to prune dead or wounded branches - Do NOT prune, cut or otherwise wound oak from April 15 to July 1 (unless the tree has become a hazard and threat to people or property). Further wounding oaks may give oak wilt another opportunity to infect. Do NOT bother applying a wound dressing to hail wounds, it's too late. Only FRESH wounds are attractive to the sap-feeding beetles; the hail wounds were only susceptible to infection for a couple of days. Also, wound dressings generally do not assist in the wound closure process and can actually hinder proper healing.

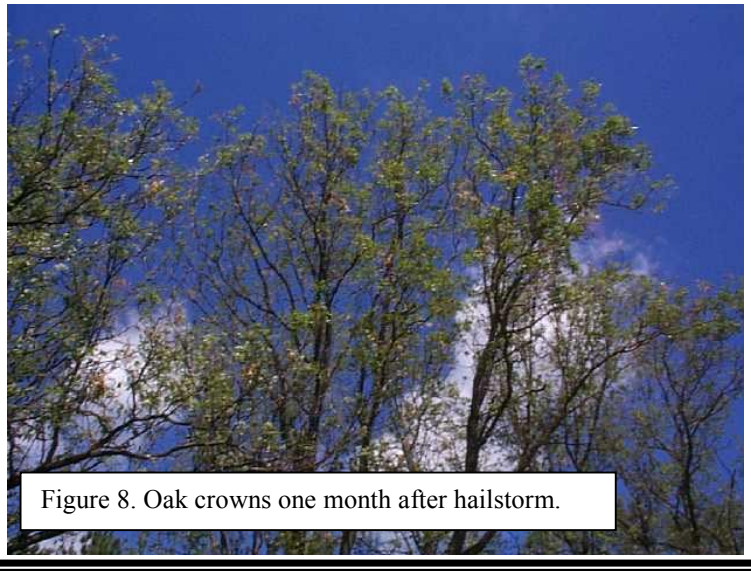
Figure 8. Oak crowns one month after hailstorm.

OAK - BUD DAMAGE

Some of the buds on oaks were damaged yet one month after the storm, (Figure 8) new buds have produced new foliage and crowns are looking fair to healthy. There could be a reduction in growth this year but no long-term impact is expected from the bud damage.

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